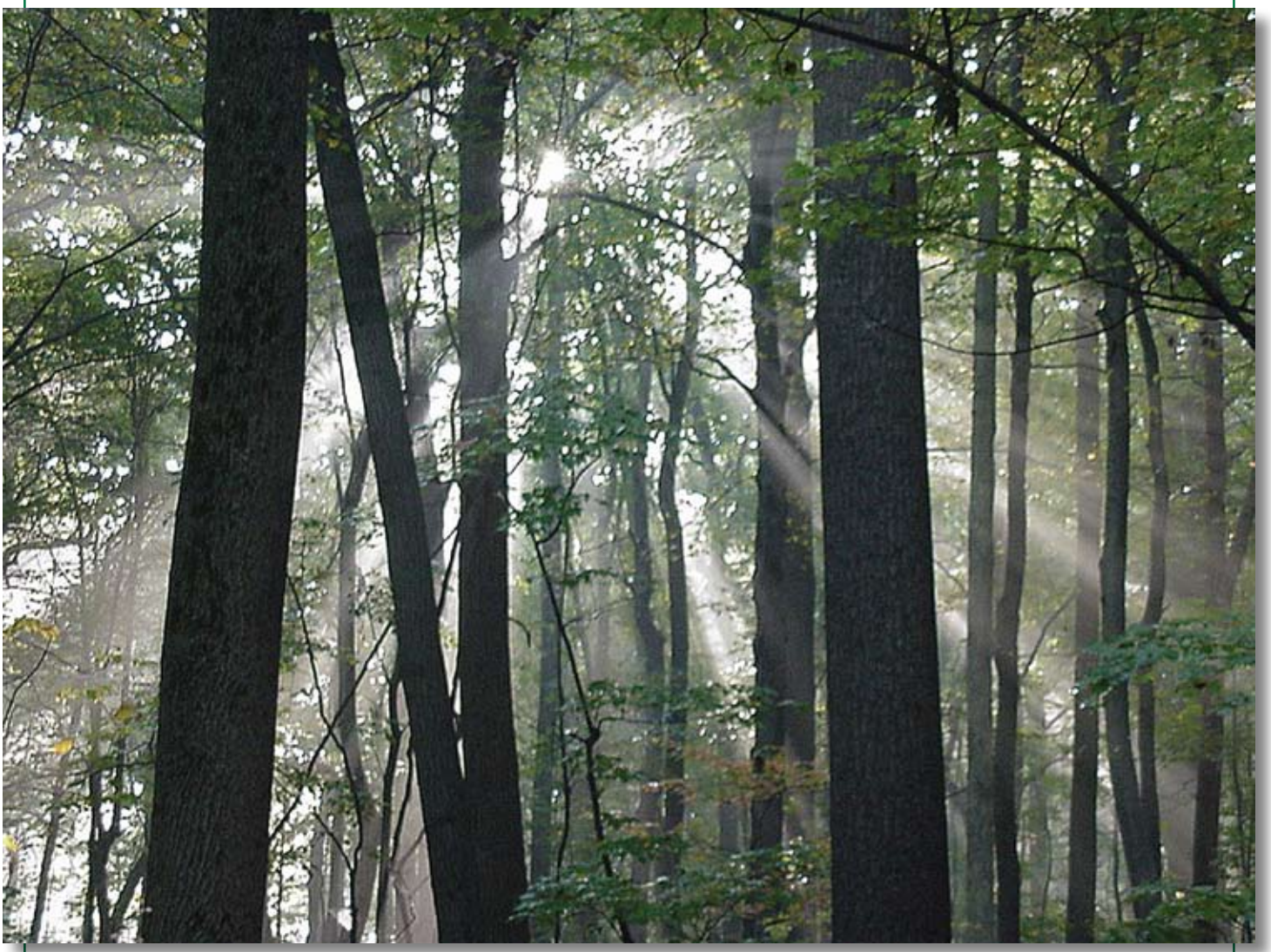
# South Mountain Reservoir Forest Stewardship Plan

2010

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# South Mountain Reservoir

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## South Mountain Reservoir Park

(166.43 Acres)

South Mountain Reservoir Park was established by condemnation in September of 1936 and is a natural resource area that serves not only the Roosevelt Park and South Mountain neighborhoods of Allentown, but also Salisbury, Emmaus, Upper Milford and Lower Macungie.

The park area has two pavilions and a walking trail network. Although not perceivable from the ground, almost half of the land included in this park is located on the south side of I-78, which bisects the park. As the name implies, the site also serves as a reservoir for the water supply within the city.

The site is primarily wooded, but there are a few open lawn areas located near the main entrance and over the cap area of the reservoir facility. The topography is generally sloped with steep sloped areas (>20%) occurring frequently.

# Forest Stewardship Plan

Aerial photo of South Mountain Reservoir


South Mountain Reservoir within the City of Allentown

## Planning the Future of the South Mountain Reservoir Forest

### What is Forest Stewardship?

Forest stewardship is the wise management and use of forest resources to ensure the health of the forest. Actively managed forests provide improved wildlife habitat, watershed protection, recreational opportunities and many other benefits for landowners and society.

### What is the Purpose of a Forest Stewardship Plan?

The purpose of a Forest Stewardship Plan is to assist forest landowners in more actively managing their forest and related resources to keep these lands in a productive and healthy condition.

Forest Stewardship plans lay out strategies for achieving landowner objectives and help to guide the landowner towards responsible forestry; provide an inventory of the natural resources within the forest, evaluates alternatives, and recommends the best options for achieving forest health so the social, environmental and economic benefits of the lands will be sustained for future generations.

### City of Allentown's Goals & Objectives

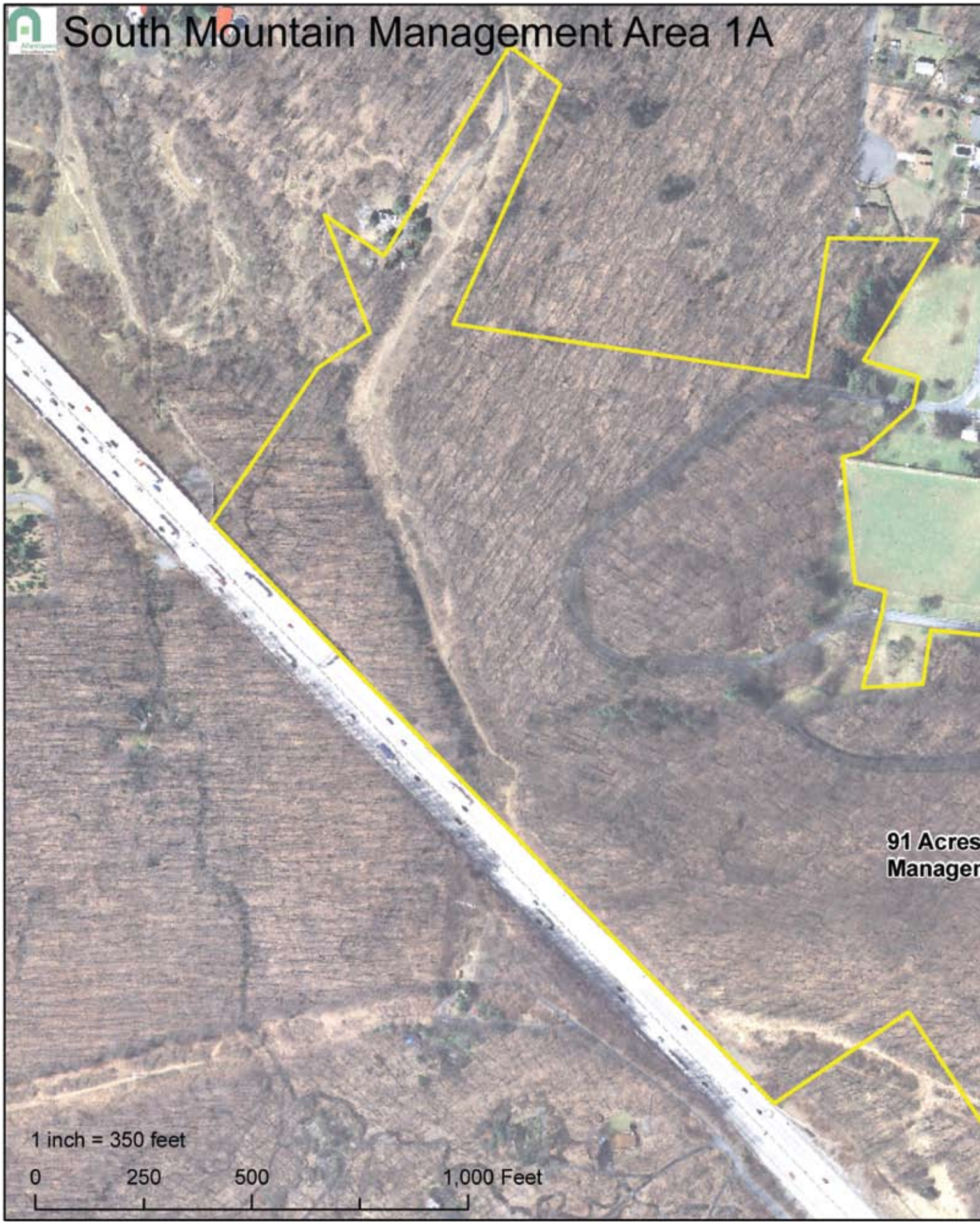
The goal for the City of Allentown is to have a healthy sustainable forest. The first objective is to conduct a thorough inventory of the trees and vegetation within the forest to determine species and assist in efforts to improve habitat. The second objective is to establish correct property lines, improve access for recreational and emergency purposes, and prevent unlawful uses within the park.

### Establishing Management Areas

This plan separates the South Mountain Reservoir Park property into two (2) Management Areas. Management Area 1A consists of 91 acres and Management Area 2A consists of 65 acres.

In addition, two additional Management Areas (1B, 2B) consisting of 113 acres, are indentified but not included in this present inventory. In the future, all four Management Areas need to be further separated into smaller Management Units based on topography, forest conditions, usages and other factors.

Directions to Management Areas 1A and 2A, property within the landscape, forest descriptions, overall forest health, species of special concern, a summary of initial fieldwork, soils, maps, wildlife and general management recommendations are provided.


South Mountain Management Area 1A
91 Acres
Manager
1 inch = 350 feet
0
250
500
1,000 Feet


# Management Area 1A

**Emmaus Avenue &**
**South 10th Street**
**91 Acres**

## Directions to Property

From Interstate 78 take the Lehigh Street exit, Exit 57;take Lehigh Street North Ramp, merge onto Lehigh Street continue about .6 miles and turn right onto Downyflake Lane. Downyflake Lane becomes Devonshire Road, turn right onto South 10th Street. Property is located at the end of 10th Street.

## Property within the Landscape

South Mountain Reservoir is located on the south side of the City of Allentown. Management Area 1A is surrounded to the northeast by urban housing and the southeast by residential housing with larger plots of land.

From the southwest, the property is bordered by I-78 Interstate. Northwest is bordered by one large residential property, urban housing and another parcel of land owned by the Allentown School District. The property is mostly wooded. The property does have a road system that goes around the reservoir. The reservoir itself and land lying northwest have grassy areas. There are also two bodies of water. There are no agricultural areas bordering this property.

**Management Area 1A Aerial photo**

# Management Area 1A

## General Forest Description

When first entering the woodlot, the topography is flat and the elevation is approximately 470-540 feet and the majority of the trees are tulip poplar with a variety of oak species including black oak, red oak and white oak intermixed amongst this section of the woodlot. There is also white ash, black cherry and walnut trees in the lower elevation. In the very northeast corner, there is a stand of evergreens.

**Spicebush is the dominant understory plant species on the South Mountain Reservoir.**

In this area there is also a very dense under-story with plants such as jack in the pulpit, black cohosh, maple leaved viburnum, Virginia creeper, white snake root, naked-flowered tick trefoil, false Solomon's seal, assorted violets, poison ivy, sensitive fern and cinquefoil, however, the area is mainly dominated by spicebush ranging in heights from one (1) to over eight (8) feet tall. Also amongst the under-story are invasive plants such as garlic mustard and Japanese stilt grass.

**Poison ivy growing on tree**

As you proceed into the woodlot the elevation changes gradually to approximately 580-650 feet, in this section of the woodlot the majority of the trees are oak of different species such as black, red, white and chestnut, with a few poplar, hickory and black birch trees intermixed.

The area has less under-story than the first section, but with a more diverse mixture of plant species both shrub and herbaceous such as hay scented fern, false Solomon's seal, aster, sarsaparilla, poison ivy, Virginia creeper, Christmas fern, common buckthorn, may apple, naked-flowered tick trefoil, striped pipsisewa, blueberry, mountain laurel, and maple-leaved viburnum.

Also amongst the under-story are invasive plants such as garlic mustard, wine berry, bush honeysuckle, burning bush, privet, Japanese barberry, Autumn olive, Oriental bittersweet, mulitflora rose, and Japanese stilt.

**Lookout to City of Allentown directly southeast of entrance at 680 feet.**

At the top of this incline there is one area that was built to overlook the City of Allentown, however, due to the maturity of the woodlot the view is minimal when foliage is on the trees.

At this point, the property flattens out and stays at between 630-730 feet in elevation for the remainder of the parcel. In this area the mixture of trees is about equal between poplar and oak and the under-story has the least amount of ground cover because of heavy browsing by deer. A power line runs through this section of the property. There are some trails that have been created through the woodlot by people walking, biking, and use of ATV's within the park system.

**Least amount of ground cover due to heavy deer browsing**

**Trail system that has been created by the public**


South Mountain Management Area 2A
65 Acres
Management Area 2A
1 inch = 400 feet
0
250
500
1,000 Feet

# Management Area 2A

**28Th Street SouthWest**
**65 Acres**

## Directions to Property

From Interstate 78 take the Lehigh Street exit, Exit 57;take Lehigh Street South Ramp, merge onto Lehigh Street continue about .3 miles and turn left onto 31st Street SW continue .3 miles and turn left onto W. Emmaus Avenue continue .4 miles and turn right onto 28th Street SW property is located at the end of 28th Street SW.

## Property within the Landscape

South Mountain Reservoir is located on the south side of the City of Allentown. The management area is surrounded to the northeast by Interstate 78; southeast is surrounded by residential housing with larger plots of land. From the southwest, the property is bordered by the Wildland's Conservancy owned forest. Northwest is bordered by urban housing and Trout Creek runs through the property at this site. There are no agricultural areas bordering this mostly wooded property.

**Management Area 2A Aerial photo**

# Management Area 2A

**Invasive species Garlic Mustard (above) and Japanese stilt grass (below).**

## General Forest Description

When first entering this mature woodlot at 28th street, the topography is semi-flat, the elevation is approximately 520-590 feet at the water tower. The majority of the trees are tulip poplar with a variety of species of oak trees such as black oak, red oak and white oak, intermixed amongst this section of the woodlot. There are also black cherry and white ash trees in this section.

There is a very dense under-story with plants such as jack in the pulpit, black cohosh, maple leaved viburnum, Virginia creeper, white snake root, naked-flowered tick trefoil, false Solomon's seal, assorted violets, poison ivy, sensitive fern and cinquefoil, but is dominated mainly by spicebush ranging in heights from one (1) foot to over eight (8) feet tall. Also amongst the under-story are invasive plants such as garlic mustard and Japanese stilt grass.

As you proceed to the east toward Interstate 78, the elevation gradually declines to 510 feet. Trout Creek flows north into a drainage that goes under route 78 at 480 feet. Because of the high level of moisture in this section of the woodlot, the majority of the trees are tulip poplar with red, black and white oak trees intermixed. There is also black birch in this section. There is no change in the under-story from first entering.

Proceeding southwest the elevation changes gradually to approximately 610' at this elevation the majority of trees are oak trees with tulip poplar intermixed. The oak tree is dominant due to the composition and drainage of soils. The under-story starts to thin but with a more diverse mixture of plant species including both shrub and herbaceous such as: hay scented fern, false Solomon's seal, aster, sarsaparilla, poison ivy, Virginia creeper, Christmas fern, common buckthorn, may apple, naked-flowered tick trefoil, striped pipsisewa, blueberry, mountain laurel, and maple-leaved viburnum.

**Multi-flora rose is another invasive specie growing within the woodlot.**

Also amongst the under-story are invasive plants such as garlic mustard, wine berry, bush honeysuckle, burning bush, privet, Japanese barberry, Autumn olive, Oriental bittersweet, multi-flora rose and Japanese stilt grass.

Proceeding southwest the elevation gradually changes from 610-740 feet in this rsection and the oak and tulip poplar are equal and there is a very dense under-story as when you first enter the woodlot. A power line runs through this section of the property. There are some trails that have been created through the woodlot by people walking, biking, and use of ATV's within the park system.

**ATV use within park system.**

# Management Areas 1A & 2A

The majority of trees in these areas are approximately 100+ years old. The trees range from 14-40 inch diameter at breast height (dbh). The regeneration of this woodlot is very limited due to the amount of under-story present and the lack of light hitting the forest floor due to the fullness of the canopy. This is also causing a lack of diversity and sustainability in the woodlot.

The trees within the under-story consist of birch and maple trees. Most of these species are growing under the canopy of the mature timber.

**Fullness of canopy**

**Birch trees growing in under-story.**

## Overall Forest Health

The stand is a mature, overstocked forest which is limiting regeneration and sustainability. An overstocked forest has a higher basal area, number of trees, and volume per acre as compared to a desired level for balanced growth. There is also dieback from natural mortality due to the maturity of the forest. The forest also has problems with grapevine and poison ivy growing up the trees causing crown collapse. This means that the vines will eventually grow into the canopy competing with the trees for sunlight causing the tree to eventually die.

**Grapevine growing in trees (left) Natural mortality causing the tree to fall on trail system (last two photos).**

There is no sign of any detrimental insect infestation to the woodlot that would cause a catastrophic event. There are signs of Ash Yellows, which is a bacteria-like organism that live and survive in the food-conducting tissue of an infected tree, which has caused dieback in the White Ash species. A contributing factor to this disease could possibly be the drought of 2002. The control for this disease is to remove the trees that are infected or have signs of the infection.

**Hairy Rock Cress (Arabis hirsuta)**

PHOTO BY JOHN CRELLIN

## Species of Special Concern

A Pennsylvania Natural Diversity Index (PNDI) search has been conducted for both Management Areas 1A and 2A. PNDI search determines whether there are any potential impacts to special concern species and resources located at or around the site. This resource tool is made available by Pennsylvania Natural Heritage Program. The PNDI search has stated there is a plant species that may be present on the property and also two (2) resources Northern Appalachian circumneutral seep community and erosional remnant. The plants common name is Western Hairy Rock-cress, scientific name is Arabis hirsuta. This plant is an endangered species. Before any future projects in these management areas are begun, the Pennsylvania Department of Conservation and Natural Resources would need to be contacted to perform a site analysis.

## Summary of Initial Fieldwork

Fieldwork was done on both management areas that included a 100% inventory of trees by prism cruise and increment borers were collected on numerous species.

The inventory was performed on trees 14 inch diameter and larger and were tallied by species, volume, volume by tree, number of trees and average price per thousand board feet. Form Class 80 was selected due to the diameter and height of the majority of trees in the woodlot.

The prism cruise was performed with a 10 basal area prism. The way a prism works is to hold the prism arm at a fixed position at the center of the plot, while rotating 360 degrees. When looking at the trees through the prism if the tree is touching in the prism, the tree is tallied. If the tree is not touching in the prism, there is no tally. If the tree is a borderline tree, the distance must be measured from the plot center to the tree and dbh to determine if the tree should be tallied or not. If the tree was less than 14" in diameter, the tree was tallied as pull wood. Pull wood are trees that have no merchantable value.

Increment borer samples were also taken from tulip poplar, red oak, black oak, chestnut oak and birch trees. The increment borer samples are core samples of trees taken throughout the woodlot to determine growth rate. The growth rate is calculated by taking the diameter of the tree and counting the third inch of the core samples, the first two inches consist of bark and core which will not give an accurate reading. The tulip poplar trees were growing at a slow rate of about 2% a year and the oak and birch trees were growing at similar rate of about 1.5% a year or less. Rate, as is true for size, is influenced by numerous variables such as soil, drainage, water, fertility, light and exposure. The designation "slow" means the tree grows 12" or less per year; medium refers to 13 to 24" of growth per year; and fast to 25" or greater.

### Gross volumn of tree, Form Class 80, Scribner log rule

| Tree diameter (inches) | VOLUME (board feet) BY NUMBER OF USABLE 16-FOOT LOGS | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 1½ | 2 | 2½ | 3 | 3½ | 4 | 4½ | 5 | 5½ | 6 |
| 10 | 30 | 38 | 47 | 52 | 57 | | | | | | |
| 11 | 40 | 52 | 64 | 72 | 80 | | | | | | |
| 12 | 50 | 65 | 80 | 91 | 102 | 108 | 115 | | | | |
| 13 | 62 | 82 | 101 | 116 | 130 | 139 | 148 | | | | |
| 14 | 74 | 98 | 122 | 140 | 158 | 170 | 181 | | | | |
| 15 | 88 | 117 | 146 | 169 | 192 | 208 | 223 | | | | |
| 16 | 101 | 136 | 170 | 198 | 226 | 246 | 265 | | | | |
| 17 | 116 | 156 | 197 | 230 | 264 | 288 | 312 | | | | |
| 18 | 131 | 178 | 224 | 263 | 302 | 330 | 359 | | | | |
| 19 | 148 | 202 | 256 | 300 | 345 | 378 | 411 | | | | |
| 20 | 166 | 226 | 287 | 338 | 388 | 426 | 463 | 492 | 522 | | |
| 21 | 185 | 254 | 322 | 379 | 436 | 480 | 523 | 558 | 594 | | |
| 22 | 204 | 280 | 357 | 420 | 484 | 534 | 583 | 624 | 666 | | |
| 23 | 226 | 311 | 396 | 468 | 540 | 594 | 648 | 697 | 746 | | |
| 24 | 248 | 342 | 435 | 515 | 595 | 654 | 712 | 770 | 827 | | |
| 25 | 272 | 376 | 479 | 568 | 656 | 722 | 788 | 852 | 917 | | |
| 26 | 296 | 410 | 523 | 620 | 716 | 790 | 865 | 936 | 1,007 | | |
| 27 | 322 | 446 | 570 | 677 | 784 | 865 | 946 | 1,025 | 1,104 | | |
| 28 | 348 | 482 | 617 | 734 | 851 | 940 | 1,028 | 1,114 | 1,200 | 1,278 | 1,357 |
| 29 | 376 | 522 | 667 | 794 | 921 | 1,017 | 1,113 | 1,210 | 1,306 | 1,396 | 1,487 |
| 30 | 403 | 560 | 717 | 854 | 991 | 1,094 | 1,198 | 1,306 | 1,413 | 1,515 | 1,617 |

**The inventory was performed on trees 14 inch dbh and larger; this is broken down by species, volume, volume by tree and number of trees. Form Class 80 was selected due to the diameter and height of the majority of trees in this woodlot.**

### RATE OF GROWTH (GROWTH FACTOR TABLE)

| DBH | Rings Per Inch | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 4" | .282 | .225 | .188 | .161 | .141 | .125 | .113 | .102 | .094 | .087 | .080 | .075 |
| 5" | .220 | .177 | .147 | .126 | .110 | .098 | .088 | .080 | .073 | .068 | .063 | .059 |
| 6" | .181 | .145 | .121 | .103 | .091 | .080 | .072 | .065 | .060 | .056 | .052 | .048 |
| 7" | .153 | .123 | .103 | .088 | .077 | .068 | .061 | .056 | .051 | .047 | .044 | .041 |
| 8" | .133 | .106 | .089 | .076 | .067 | .059 | .053 | .048 | .044 | .041 | .038 | .035 |
| 9" | .116 | .093 | .078 | .067 | .058 | .052 | .047 | .042 | .039 | .036 | .033 | .031 |
| 10" | .105 | .084 | .070 | .060 | .053 | .047 | .042 | .038 | .035 | .032 | .030 | .028 |
| 11" | .095 | .076 | .063 | .054 | .047 | .042 | .038 | .034 | .032 | .029 | .027 | .025 |
| 12" | .087 | .070 | .058 | .050 | .044 | .039 | .035 | .032 | .029 | .027 | .025 | .023 |
| 13" | .080 | .064 | .053 | .046 | .040 | .035 | .032 | .029 | .027 | .025 | .023 | .021 |
| 14" | .074 | .059 | .049 | .042 | .037 | .033 | .030 | .027 | .025 | .024 | .021 | .020 |
| 15" | .069 | .055 | .046 | .039 | .034 | .031 | .028 | .025 | .023 | .021 | .020 | .018 |
| 16" | .064 | .052 | .043 | .037 | .032 | .029 | .026 | .023 | .021 | .020 | .018 | .017 |
| 17" | .061 | .048 | .040 | .035 | .030 | .027 | .024 | .022 | .020 | .019 | .017 | .016 |
| 18" | .057 | .046 | .038 | .033 | .029 | .025 | .023 | .021 | .019 | .018 | .016 | .015 |
| 19" | .054 | .043 | .036 | .031 | .027 | .024 | .022 | .020 | .018 | .017 | .015 | .014 |
| 20" | .051 | .041 | .034 | .029 | .025 | .023 | .020 | .019 | .017 | .016 | .015 | .014 |
| 21" | .049 | .039 | .033 | .028 | .024 | .022 | .020 | .018 | .016 | .015 | .014 | .013 |
| 22" | .046 | .037 | .031 | .027 | .023 | .021 | .019 | .017 | .015 | .014 | .013 | .012 |

**Increment borer sample**

## Tree Inventory

Over 4,000 different trees were tallied in the two Management Areas. The inventory on both Management Areas indicated the dominant species as Tulip Poplar with over 1,000 trees tallied.

In Management Area 1A, the second dominant species was Black Oak with 435 trees tallied, then Red Oak (347), Black Birch (277) and Chestnut Oak (176). In addition, there were six (6) other species of trees identified and tallied.

In Management Area 2A, Red Oak (542), Black Oak (550), Black Birch (231), and Chestnut Oak (186) were the dominant species tallied. In addition, there were (5) other species of trees identified and tallied in this area.

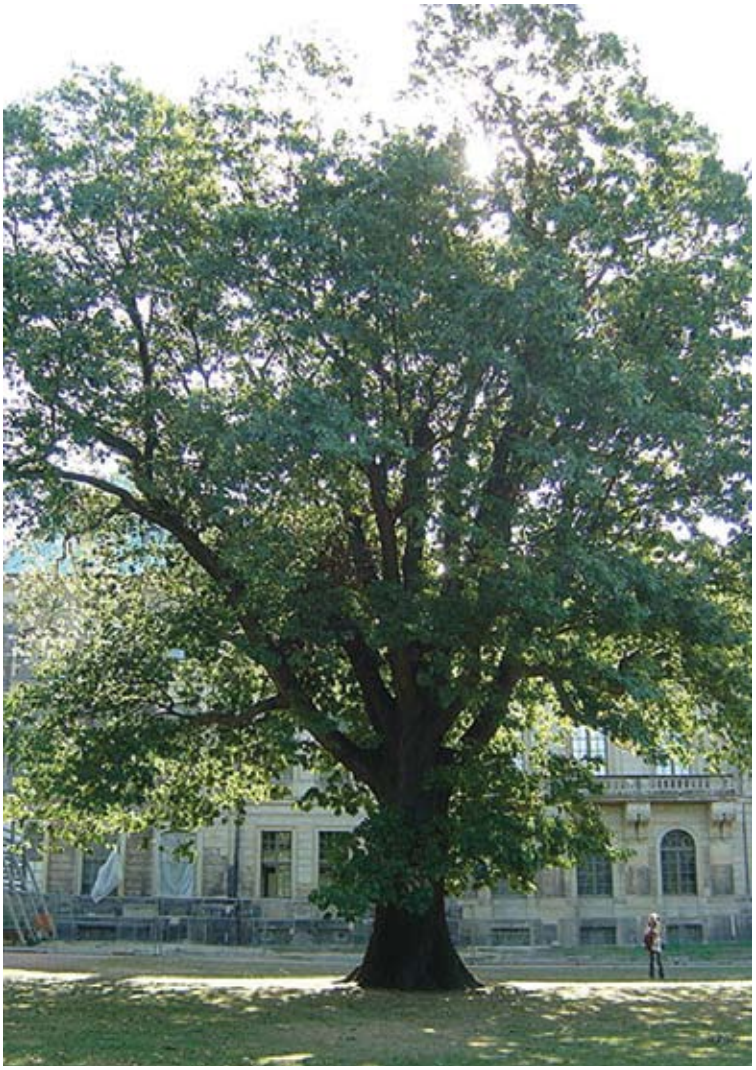
**Black Birch (above)**

**Yellow Poplar tree structure and mature bark**

## South Mountain Reservoir Management Area 1A

1A

| Species | Volume | Volume/Tree | # of Trees |
|---|---|---|---|
| Yellow Poplar | 313254 | 557 | 562 |
| Black Oak | 145003 | 333 | 435 |
| Red Oak | 104076 | 300 | 347 |
| Black Birch | 37073 | 134 | 277 |
| Chestnut Oak | 36475 | 207 | 176 |
| White Oak | 22227 | 318 | 70 |
| White Ash | 17605 | 210 | 84 |
| Hickory | 3770 | 222 | 17 |
| Red Maple | 2893 | 181 | 16 |
| Black Walnut | 1259 | 210 | 6 |
| Black Cherry | 732 | 183 | 4 |
| **Totals** | **684367** | | **1994** |



Northern Red Oak

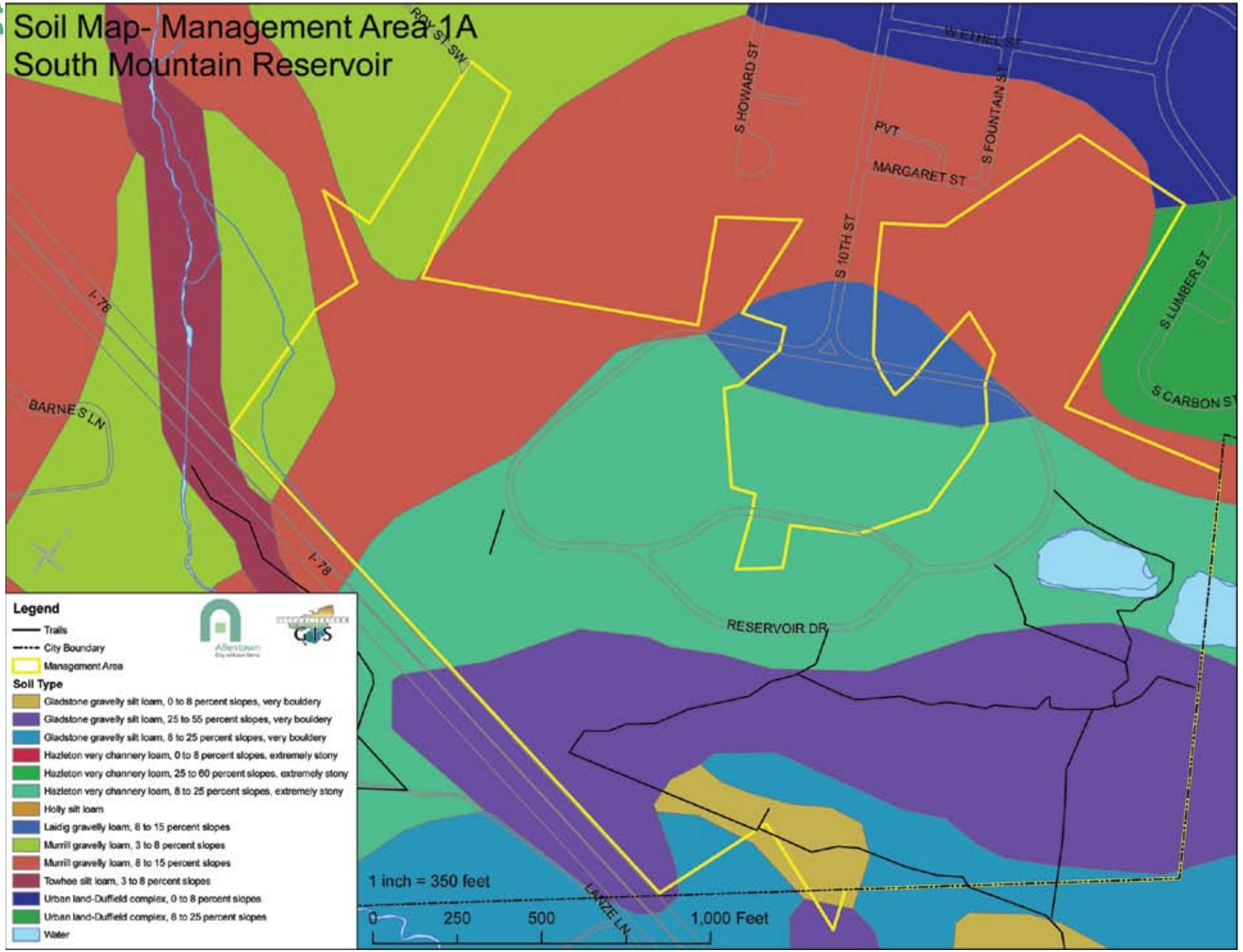
"Nothing is more beautiful than the loveliness of the woods before sunrise."
—George Washington Carver

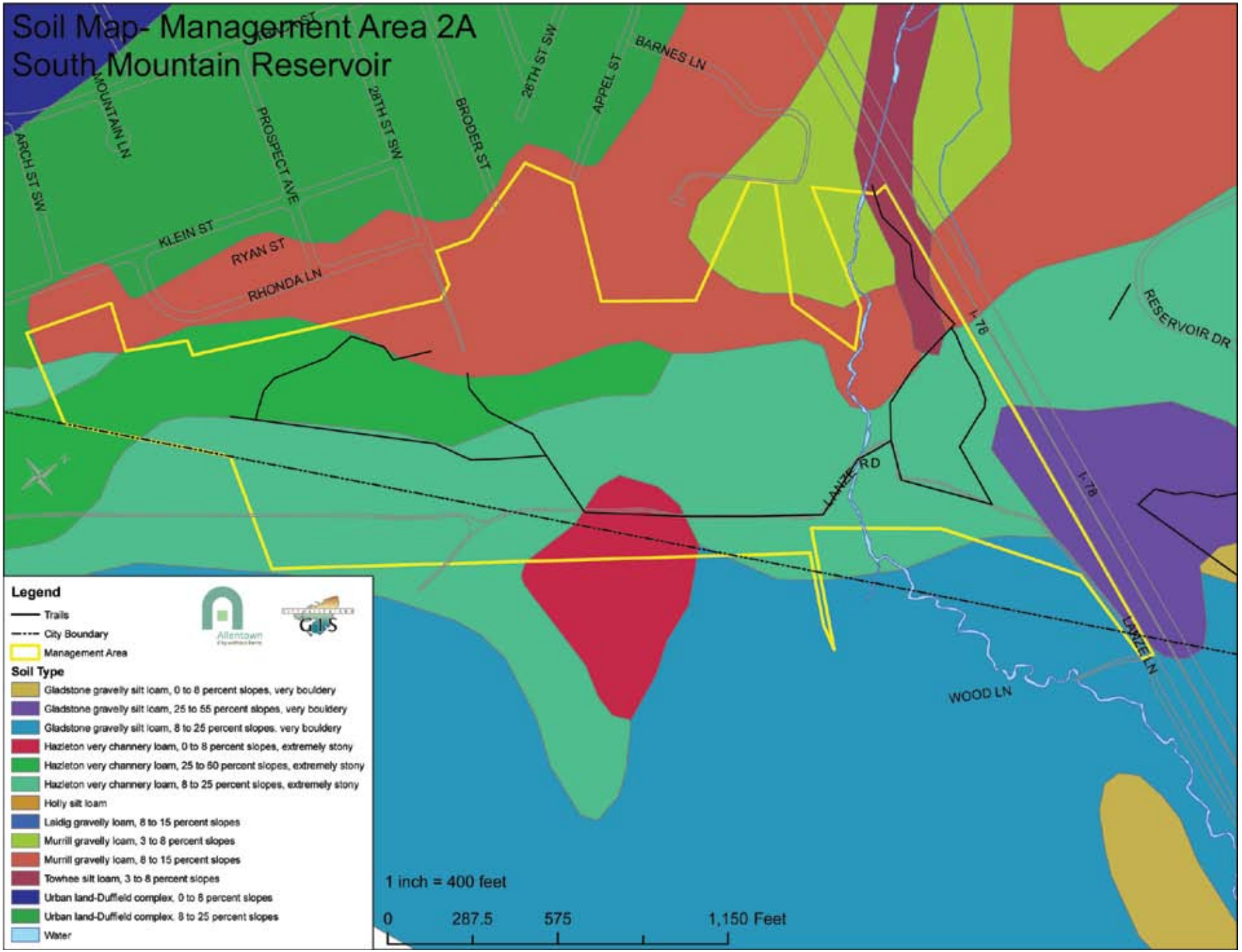
Black Oak

## South Mountain Reservoir Management Area 2A

| Species | Volume | Volume/Tree | # of Trees |
|---|---|---|---|
| Yellow Poplar | 266163 | 508 | 524 |
| Red Oak | 150788 | 278 | 542 |
| Black Oak | 148482 | 270 | 550 |
| Black Birch | 26433 | 114 | 231 |
| Chestnut Oak | 40794 | 219 | 186 |
| Red Maple | 4119 | 229 | 18 |
| White Oak | 2103 | 263 | 8 |
| White Ash | 2076 | 260 | 8 |
| Hickory | 234 | 117 | 2 |
| Black Cherry | 131 | 131 | 1 |
| **Totals** | **641323** | | **2070** |

2A


Soil Map- Management Area 1A
South Mountain Reservoir
ROY ST SW
S HOWARD ST
W ETHEL ST
PVT
S FOUNTAIN ST
MARGARET ST
S 10TH ST
S LUMBER ST
S CARBON ST
I-78
BARNES LN
I-78
RESERVOIR DR
LANZE LN
Legend
Trails
City Boundary
Management Area
Soil Type
Gladstone gravelly silt loam, 0 to 8 percent slopes, very bouldery
Gladstone gravelly silt loam, 25 to 55 percent slopes, very bouldery
Gladstone gravelly silt loam, 8 to 25 percent slopes, very bouldery
Hazleton very channery loam, 0 to 8 percent slopes, extremely stony
Hazleton very channery loam, 25 to 60 percent slopes, extremely stony
Hazleton very channery loam, 8 to 25 percent slopes, extremely stony
Holly silt loam
Laidig gravelly loam, 8 to 15 percent slopes
Murrill gravelly loam, 3 to 8 percent slopes
Murrill gravelly loam, 8 to 15 percent slopes
Towhee silt loam, 3 to 8 percent slopes
Urban land-Duffield complex, 0 to 8 percent slopes
Urban land-Duffield complex, 8 to 25 percent slopes
Water
1 inch = 350 feet
0
250
500
1,000 Feet


Soil Map- Management Area 2A
South Mountain Reservoir
ARCH ST SW
MOUNTAIN LN
PROSPECT AVE
28TH ST SW
BRODER ST
26TH ST SW
APPEL ST
BARNES LN
KLEIN ST
RYAN ST
RHONDA LN
I-78
RESERVOIR DR
LANZE RD
WOOD LN
LANZE LN
Legend
Trails
City Boundary
Management Area
Soil Type
Gladstone gravelly silt loam, 0 to 8 percent slopes, very bouldery
Gladstone gravelly silt loam, 25 to 55 percent slopes, very bouldery
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Hazleton very channery loam, 0 to 8 percent slopes, extremely stony
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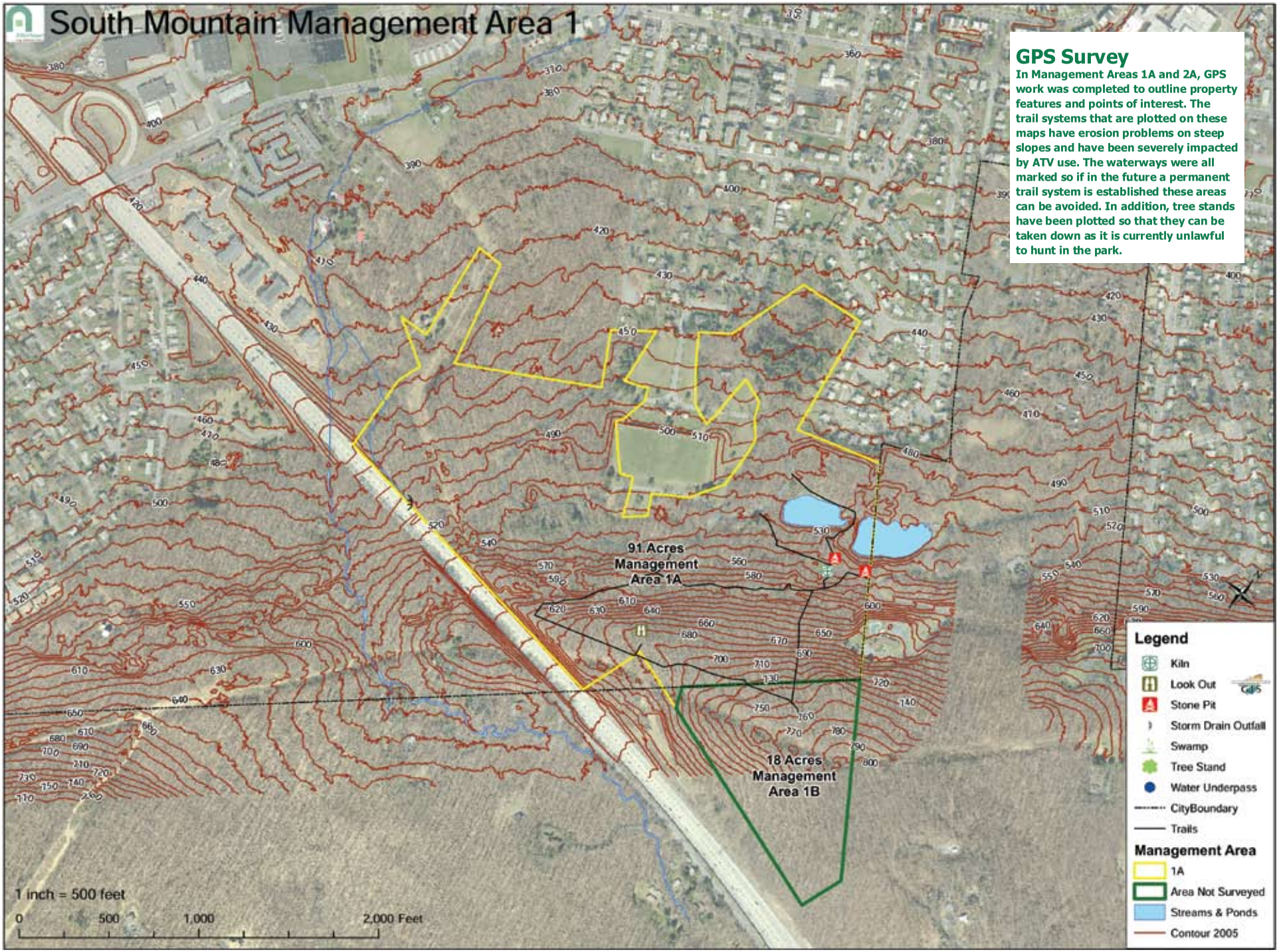
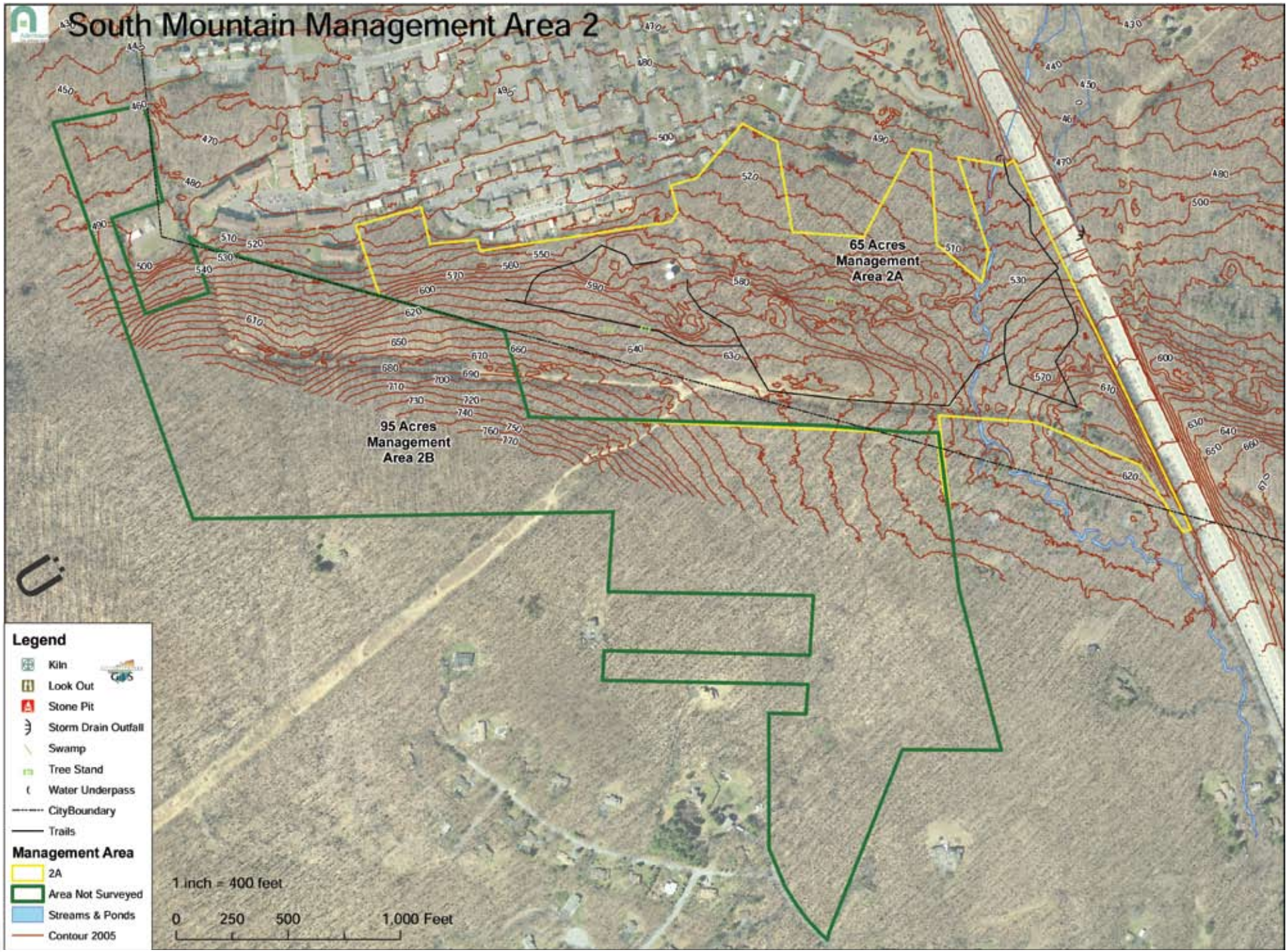
Hazleton very channery loam, 8 to 25 percent slopes, extremely stony
Holly silt loam
Laidig gravelly loam, 8 to 15 percent slopes
Murrill gravelly loam, 3 to 8 percent slopes
Murrill gravelly loam, 8 to 15 percent slopes
Towhee silt loam, 3 to 8 percent slopes
Urban land-Duffield complex, 0 to 8 percent slopes
Urban land-Duffield complex, 8 to 25 percent slopes
Water
Allentown
GIS
1 inch = 400 feet
0
287.5
575
1,150 Feet


South Mountain Management Area 1
GPS Survey
In Management Areas 1A and 2A, GPS work was completed to outline property features and points of interest. The trail systems that are plotted on these maps have erosion problems on steep slopes and have been severely impacted by ATV use. The waterways were all marked so if in the future a permanent trail system is established these areas can be avoided. In addition, tree stands have been plotted so that they can be taken down as it is currently unlawful to hunt in the park.
91 Acres Management Area 1A
18 Acres Management Area 1B
Legend
Kiln
Look Out
Stone Pit
Storm Drain Outfall
Swamp
Tree Stand
Water Underpass
CityBoundary
Trails
Management Area
1A
Area Not Surveyed
Streams & Ponds
Contour 2005
1 inch = 500 feet
0
500
1,000
2,000 Feet


South Mountain Management Area 2
65 Acres
Management
Area 2A
95 Acres
Management
Area 2B
Legend
Kiln
Look Out
Stone Pit
Storm Drain Outfall
Swamp
Tree Stand
Water Underpass
CityBoundary
Trails
Management Area
2A
Area Not Surveyed
Streams & Ponds
Contour 2005
1 inch = 400 feet
0 250 500 1,000 Feet

# General Management Area Recommendations

The City of Allentown has made the first step towards promoting forest stewardship on the South Mountain Reservoir. These general recommendations are just the starting point.

After completing the remainder of the inventory of the city owned land that borders the South Mountain Reservoir, these Management Areas need to be divided into smaller Management Units and specific recommendations need to be based on topography, forest conditions, threats, uses and other variables.

**1. Form a South Mountain Management Committee.**

a. Recognizing that any type of forest management philosophy, practice or policy may be controversial, the City of Allentown should develop a committee of natural resource professionals with expertise in various disciplines including but not limited to forestry, wildlife, soils, parks & recreation, environmental education, geology, horticulture, ect. to establish and recommend written objectives, review plans and provide informational and educational programs to inform the public and elected officials on the benefits of forest stewardship on South Mountain.

**2. Complete inventory on remainder of City property that borders South Mountain Reservoir park property. Develop and divide each Management Area (1A, 2A, 1B, 2B) into specific Management Units.**

a. In Management Area 1B there is approximately 18 acres.

b. In Management Area 2B there is approximately 95 acres.

c. Complete a 100% tally of 14" trees and larger by prism cruise, complete increment borer samples to determine growth rate in each parcel. There should be samples done for dominant species such as oak and poplar. There should also be samples taken from shade tolerant trees such as red maple and black birch. The samples should be taken from multiple areas of the property so that a true growth rate can be determined.

d. Inventory of native and invasive plant species as well as wildlife should continue.

e. Conduct PNDI search on additional property.

f. All trail systems, potential erosion hazards, waterways and points of interest should be established on property maps.

g. Cultural, geological and vegetative features should be noted.

i. Development of general land use classifications for each Management Unit including but not limited to: natural areas, natural environment areas, biodiversity management areas, and private areas.

j. Once inventory is complete, a summary and specific recommendations for each Management Unit should be developed along with an activity schedule for the next ten years.

**Private signage improperly used on the City's property.**

### 3. Conduct a detailed survey to establish and post accurate property lines.

a. Accurate property lines prevent adjoining landowners from encroaching on land owned by the City of Allentown.
b. This will allow for better utilization of access points to the park system which will assist in enforcement of park rules and regulations.
c. Accurate property lines will also aid in designing a trail system.

**Property line markers define the City limits.**

### 4. Under-story improvements pilot project should be performed under guidance of PA Department of Conservation and Natural Resources Bureau of Forestry.

a. In order to have successful regeneration of desirable species, the first step is to analyze the current condition of the understory in specific Management Units.
b. Currently, there is a very dense cover of spicebush in a majority of the Management Areas that is inhibiting any light from hitting the forest floor even if the canopy was opened. This should be controlled within the forest to promote tree regeneration.
c. In general and depending on costs and labor, the City may utilize mechanical or chemicals to control undesirable understory plants and invasive species.
d. After canopy has been opened this should help to release the seed bed that has been established by the existing trees.
e. There are also native species that have been established on the forest floor which may be affected by these improvements to the under-story but will eventually regenerate once conditions become optimal for growth.

**This is an example of an under-story in need of the improvement project.**

## 5. Timber Stand Improvement pilot project should be performed by fencing and monitoring of one specific Management Unit.

a. The most desirable area for timber stand improvement would be in Management Unit 1A. The pilot project should be approximately forty (40) acres and located close to the road system so that the public can observe the progression.

b. The City of Allentown should consider fencing the area to monitor the growth impacted by wildlife. If it is determined that the wildlife is harming the sustainability of the forest, a plan could be implemented to control the damage.

c. Another area to consider fencing would be food plots. This will allow food plots to grow to full potential before animal browsing.

**Results from Monmouth County Park System (above) permanent fence shows percentage of cover dramatically increases inside enclosure when deer browsing is controlled.**

**Example of a fence enclosure in Elk County Pennsylvania**

## 6. Retirement of current trail system where feasible and establishing food plots.

a. The trail system should be seeded down with a perennial rye grass, clover and tree foil. This will help stabilize trails to prevent erosion as well as provide wildlife an alternative food source.

b. The City of Allentown should also plant other trees and bushes along the trails that would produce fruits and berries that would help to support wildlife in the park system and visibility of the animals by people utilizing the trails.

**ATV use within the park system"**

c. There is also a need for food plots. The power-lines that run through each management unit could be utilized for food plots.
d. These food plots should be planted with different types of vegetation that will be utilized at different times of the year. Vegetation such as clover, tree foil and chicory are predominately summer foods. Also, vegetation such as; turnips and brassica could be planted for fall feed.



**Proposed area for possible food plots**

### 7. Design a trail system so that a plan for forest sustainability can be implemented.

a. An "official" trail system should be developed that connects all parcels within the park boundaries and utilization of all access points.
b. The trail system should allow for patrolling the park for unlawful acts such as loitering, hunting, and ATV use and emergency personnel.
c. The trail system should be promoted to the public for various activities that could be held within the park.

### 8. Managing deer population to promote hardwood forest regeneration.

a. There are signs of heavy deer browsing throughout the forest.
b. The City of Allentown should work with the Pennsylvania Game Commission to determine the amount of deer on South Mountain.
c. If numbers of deer are beyond threshold established by the Pennsylvania Game Commission, the City should consider establishing a deer management program.

**Tree stand built on City of Allentown's property**

## References:

Forest Stewardship Program, National Standards and Guidelines
DCNR Forest Stewardship Manual
City of Allentown Parks & Recreation Master Plan
Understory species provided by Tim Dugan, DCNR
USDA Forest Service http://www.fs.fed.us/
Maps and surveys provided by City of Allentown, GSI Center Brian Borzak and Scott Rawhouser
Ash Yellows disease information provided by Randy Fey, City of Allentown
Form Class 80 Table~ timberquote.com
Pictures of invasive species and wildlife from internet research
Growth Rate Table~ Timber Management Field Book (2008) US Department of Agriculture (Forest Service)
Manual of Woody Landscape Plants, by Michael Dirr.
Wildlands Conservancy Forest Stewardship Plan, South Mountain Preserve

# South Mountain Reservoir Wildlife

South Mountain Reservoir is home to a myriad of wildlife. Many mammals including deer, fox, raccoon, squirrels, turkey and chipmunks call South Mountain home. There are also a variety of bird species, amphibians and reptiles that can be found.

For more information on South Mountain and other parks in Allentown, please visit www.allentownpa.org.

PHOTO BY RANDY COPE

WILDLIFE PHOTOS COURTESY OF TOM GETTINGS, WILDLANDS CONSERVANCY